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# **Installing T1 Link Modules in BN Platforms**

**NORTEL**  
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**Notice:** The Industry Canada label identifies certified equipment. This certification means that the equipment meets telecommunications network protective, operational and safety requirements as prescribed in the appropriate Terminal Equipment Technical Requirements document(s). The Department does not guarantee the equipment will operate to the user's satisfaction.

Before installing this equipment, users should ensure that it is permissible to be connected to the facilities of the local telecommunications company. The equipment must also be installed using an acceptable method of connection. The customer should be aware that compliance with the above conditions may not prevent the degradation of service in some situations.

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## Canada Requirements Only *(continued)*

Repairs to certified equipment should be coordinated by a representative designated by the supplier. Any repairs or alterations made by the user to this equipment, or equipment malfunctions, may give the telecommunications company cause to request the user to disconnect the equipment.

Users should ensure for their own protection that the electrical ground connections of the power utility, telephone lines and internal metallic water pipe system, if present, are connected together. This precaution may be particularly important in rural areas.

**Caution:** Users should not attempt to make such connections themselves, but should contact the appropriate electric inspection authority, or electrician, as appropriate.

**Notice:** For equipment using loopstart lines, please note that the Ringer Equivalence Number (REN) assigned to each terminal device provides an indication of the maximum number of terminals allowed to be connected to a telephone interface. The termination on an interface may consist of any combination of devices subject only to the requirement that the sum of the Ringer Equivalence Numbers of all the devices does not exceed 5. The REN is located on the "FCC Rules Part 68" label located on the bracket of the module, or on the back of the unit.

## Canada CS-03 -- Règles et règlements

**Avis:** L'étiquette d'Industrie Canada identifie le matériel homologué. Cette étiquette certifie que le matériel est conforme aux normes de protection, d'exploitation et de sécurité des réseaux de télécommunications, comme le prescrivent les documents concernant les exigences techniques relatives au matériel terminal. Le Ministère n'assure toutefois pas que le matériel fonctionnera à la satisfaction de l'utilisateur.

Avant d'installer ce matériel, l'utilisateur doit s'assurer qu'il est permis de le raccorder aux installations de l'entreprise locale de télécommunication. Le matériel doit également être installé en suivant une méthode acceptée de raccordement. L'abonné ne doit pas oublier qu'il est possible que la conformité aux conditions énoncées ci-dessus n'empêche pas la dégradation du service dans certaines situations.

Les réparations de matériel homologué doivent être coordonnées par un représentant désigné par le fournisseur. L'entreprise de télécommunications peut demander à l'utilisateur de débrancher un appareil à la suite de réparations ou de modifications effectuées par l'utilisateur ou à cause de mauvais fonctionnement.

Pour sa propre protection, l'utilisateur doit s'assurer que tous les fils de mise à la terre de la source d'énergie électrique, des lignes téléphoniques et des canalisations d'eau métalliques, s'il y en a, sont raccordés ensemble. Cette précaution est particulièrement importante dans les régions rurales.

**Avertissement:** L'utilisateur ne doit pas tenter de faire ces raccordements lui-même; il doit avoir recours à un service d'inspection des installations électriques, ou à un électricien, selon le cas.

**Avis:** Veuillez prendre note que pour tout appareillage supportant des lignes de type "loopstart," l'indice d'équivalence de la sonnerie (IES) assigné à chaque dispositif terminal indique le nombre maximal de terminaux qui peuvent être raccordés à une interface. La terminaison d'une interface téléphonique peut consister en une combinaison de quelques dispositifs, à la seule condition que la somme d'indices d'équivalence de la sonnerie de tous les dispositifs n'excède pas 5. Le REN figure sur l'étiquette "FCC Rules Part 68" située sur le support du module ou à l'arrière de l'unité.

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## FCC Part 68 Compliance Statement

This equipment complies with Part 68 of FCC Rules. All direct connections to telephone network lines must be made using standard plugs and jacks compliant with FCC Part 68. Please note the following:

1. You are required to request service from the telephone company before you connect the unit to a network. When you request service, you must provide the telephone company with the following data:
  - When you request T1 Service, you must provide the telephone company with
    - The Facility Interface Code
    - Provide the telephone company with all the codes below:
      - 04DU9-BN (1.544 MB, D4 framing format)
      - 04DU9-DN (1.544 MB, D4 framing format with B8ZF coding)
      - 04DU9-1KN (1.544 MB, ESF framing format)
      - 04DU9-1SN (1.544 MB, ESF framing format with B8ZF coding)
      - 04DU9-1ZN (1.544 MB, ANSI ESF and ZBTSI without line power)
    - The telephone company will select the code it has available.
    - The Service Order Code(s) (SOC): 6.0F
    - The required Universal Service Order Code (USOC) jack: RJ48C
  - When you request Primary Rate ISDN Service, you must provide the telephone company with
    - The Facility Interface Code: 04DU9-1SN (1.544 MB, ESF framing format with B8ZF coding)
    - The Service Order Code(s) (SOC): 6.0F
    - The required Universal Service Order Code (USOC) jack: RJ48C
2. Your telephone company may make changes to its facilities, equipment, operations, or procedures that could affect the proper functioning of your equipment. The telephone company will notify you in advance of such changes to give you an opportunity to maintain uninterrupted telephone service.
3. If the unit causes harm to the telephone network, the telephone company may temporarily discontinue your service. If possible, they will notify you in advance, but if advance notice is not practical, you will be notified as soon as possible and will be informed of your right to file a complaint with the FCC.
4. If you experience trouble with the unit, please contact the Nortel Networks Technical Solutions Center in your area for service or repairs. Repairs should be performed only by service personnel authorized by Nortel Networks.

United States	1-800-2LANWAN
Valbonne, France	33-4-92-96-69-68
Sydney, Australia	61-2-9927-8800
Tokyo, Japan	81-3-5740-1700
5. You are required to notify the telephone company when you disconnect the unit from the network.

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# Preface

Read this guide if you are responsible for installing a Nortel Networks® Dual T1, or Single-, Dual-, or Quad-Port Multichannel T1 (MCT1, QMCT1, or QMCT1-DS0A) link module in these Backbone Node (BN®) platforms:

- Backbone Link Node (BLN®)
- Backbone Link Node-2 (BLN-2)
- Backbone Concentrator Node (BCN®)

This guide describes how to

- Prepare for installation and configure the link module jumpers if necessary
- Install the link module
- Interpret the LEDs on the link module



**Note:** Experienced network operators can safely perform the user-serviceable procedures described in this book; however, only authorized Nortel Networks service technicians can perform other maintenance procedures not described in this book.

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## Text Conventions

This guide uses the following text conventions:

### **bold text**

Indicates command names and options and text that you need to enter.

Example: Enter **show ip {alerts | routes}**.

Example: Use the **dinfo** command.

### *italic text*

Indicates file and directory names, new terms, book titles, and variables in command syntax descriptions. Where a variable is two or more words, the words are connected by an underscore.

Example: If the command syntax is:

**show at <valid\_route>**

*valid\_route* is one variable and you substitute one value for it.

## Acronyms

This guide uses the following acronyms:

FRE	Fast Routing Engine
ILI	Intelligent Link Interface
LED	light-emitting diode
MCT1	Multichannel T1
QMCT1	Quad-Port Multichannel T1



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Technical Solutions Center	Telephone
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North America	(800) 2LANWAN or (800) 252-6926
Asia Pacific	(61) (2) 9927-8800
China	(800) 810-5000

An Express Routing Code (ERC) is available for many Nortel Networks products and services. When you use an ERC, your call is routed to a technical support person who specializes in supporting that product or service. To locate an ERC for your product or service, go to the [www12.nortelnetworks.com/](http://www12.nortelnetworks.com/) URL and click ERC at the bottom of the page.



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# Chapter 1

## Preparing for Installation



**Note:** *In this guide, the term T1 includes MCT1, QMCT1, and QMCT1-DS0A link modules, unless referring to a specific model.*

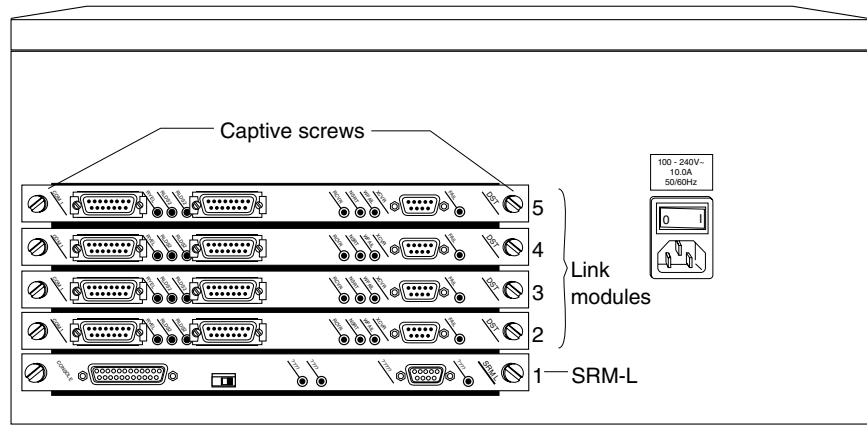
Depending on your configuration, complete these preliminary tasks as needed to install the T1 link module:

- Choose a slot
- Remove a link module
- Configure jumper settings

### Choosing a Slot

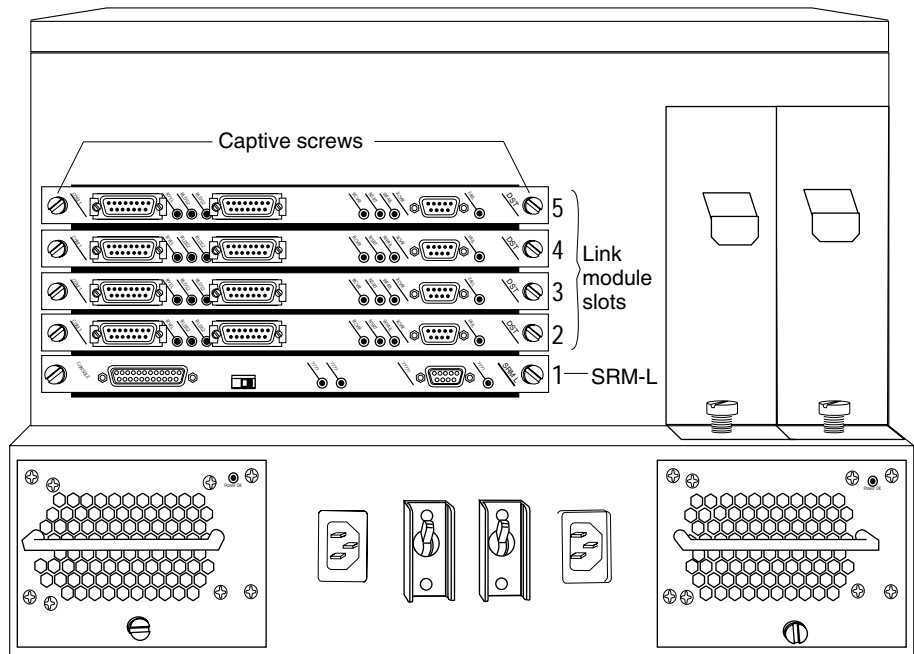
You can install the T1 link module in

- Slots 2 through 5 in the BLN platform ([Figure 1-1](#))
- Slots 2 through 5 in the BLN-2 platform ([Figure 1-2](#))
- Slots 1 through 6 and Slots 8 through 14 in the BCN platform ([Figure 1-3](#))



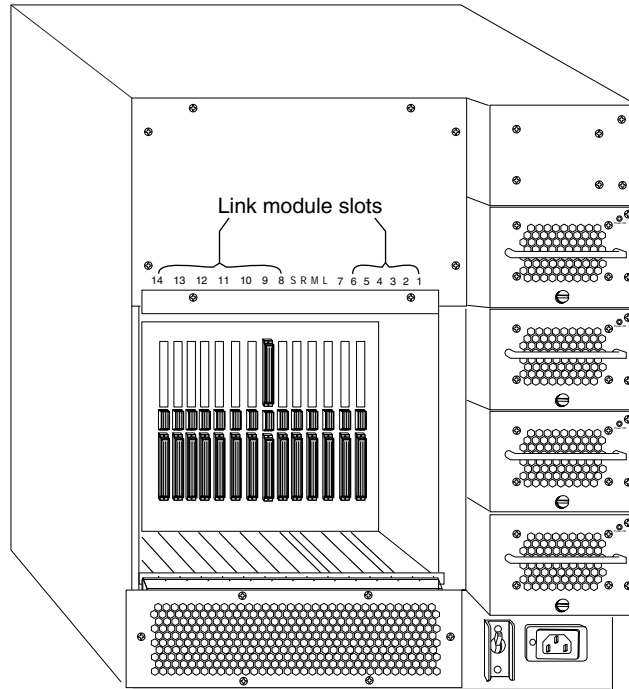
QMC0008A

**Figure 1-1. Link Module Slots in a BLN Platform**



QMC0009A

**Figure 1-2. Link Module Slots in a BLN-2 Platform**



QMC0012A

**Figure 1-3. Link Module Slots in a BCN Platform**

## Removing a Link Module

If there are no empty slots in your BN platform, you must remove a link module to install the T1. When replacing a configured link module, you must delete all configured circuits (ports) from the slot so that the BN platform software can properly configure the new link module.



**Note:** *When replacing a Dual MCT1 link module with a Quad MCT1 (QMCT1 or QMCT1-DS0A) link module, you do not need to reconfigure Ports 1 and 2; if, however, you intend to use Ports 3 and 4 on the QMCT1 or QMCT1-DS0A, you must reconfigure the entire slot.*

Refer to *Configuring Routers* if you have router software or *Getting Started with Site Manager* if you have BayStream software for instructions on editing a configuration file and deleting circuits.

The Backbone Node hot-swap feature allows you to remove or replace a link module with the chassis power on or off.



**Danger:** *Do not remove more than two adjacent modules with the power on.*

When you remove a link module with the power on, the services that slot provides become disrupted. After the slot fails to receive packets, the other link modules in the chassis resynchronize their routing tables and continue uninterrupted.

The procedure for removing a link module is the same for the BLN, BLN-2, and BCN platforms:

1. **Disconnect any exterior cables from the link module.**
2. **Attach an antistatic wrist strap.**

BN platforms and link modules ship with an antistatic wrist strap. You must wear one of these straps when accessing components on BN platforms. The antistatic wrist strap directs the discharge of static electricity from your body to the chassis, thereby avoiding discharge and possible damage to sensitive electronic components.



**Caution:** *Electrostatic discharge can damage hardware. Always use the antistatic wrist strap when handling any component on your BN platform.*

3. **Loosen the captive screw on each end of the module.**
4. **Grasp the sides of the module and pull it out of the slot.**
5. **Place the module in an antistatic protective bag.**

## **Configuring Jumper Settings**

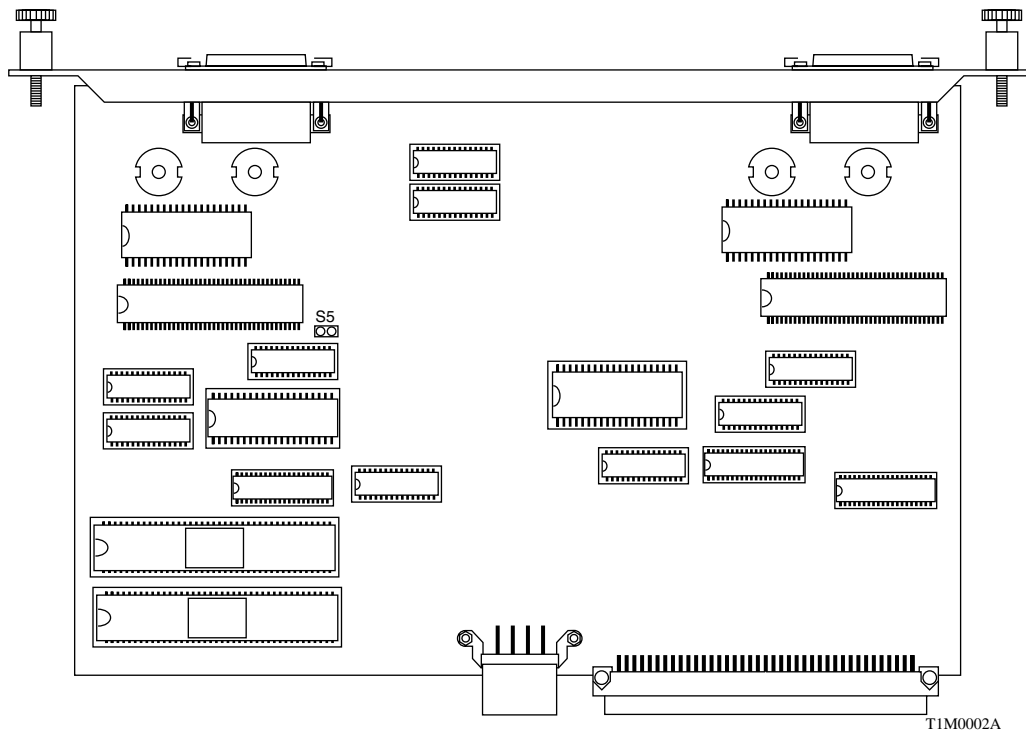
The following T1 link modules contain at least one user-configurable jumper setting:

- Dual T1 (Order Nos. 5200 and 5201)
- QMCT1 (Order No. AG2111007)
- QMCT1-DS0A (Order No. AG2104052)

Before you install any of these link modules, make sure the jumper settings on the link module match your configuration. The following sections describe only the user-configurable jumper settings; changing the settings of any other jumpers on the link module can jeopardize module functioning.

## Setting Jumpers on the Dual T1 Link Module

[Figure 1-4](#) shows the user-configurable jumper on the Dual T1 link module (Order Nos. 5200 and 5201).



**Figure 1-4. Jumper on the Dual T1 Link Module**

Before installing the T1 link module, refer to [Table 1-1](#) to ensure that the jumper setting on the link module matches your configuration.

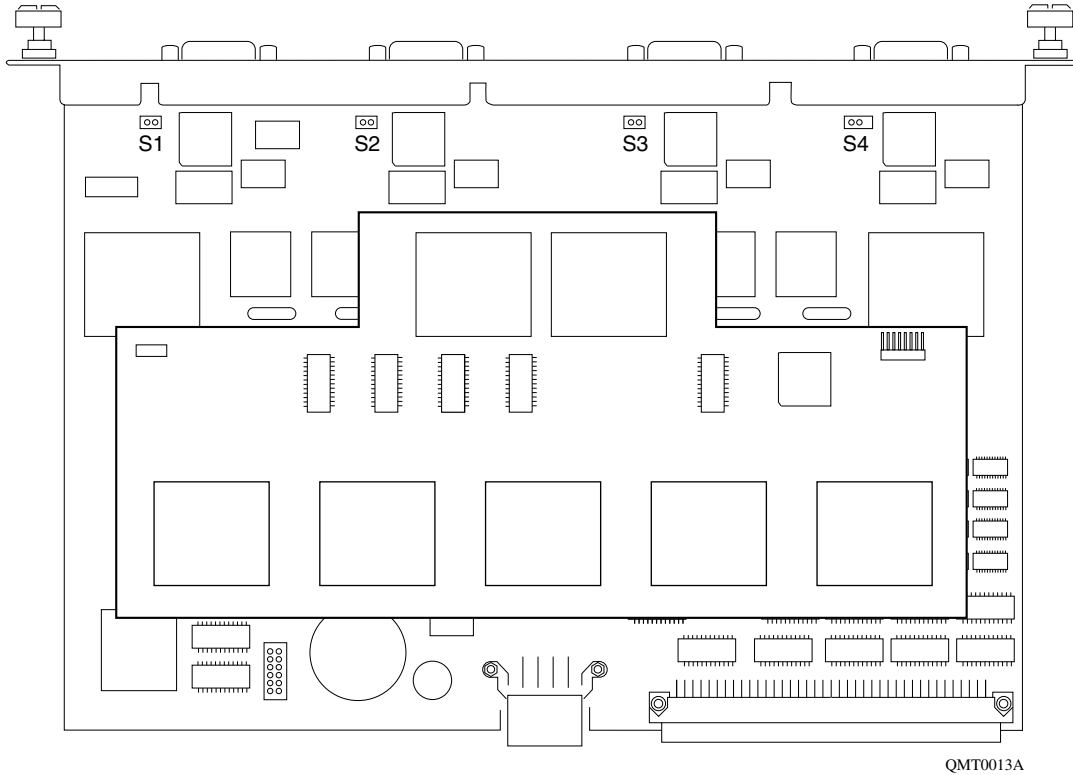
**Table 1-1. Dual T1 Link Module Jumper Settings**

Option	Setting	Jumper
Internal clock	Enabled	S5
	Disabled	S5



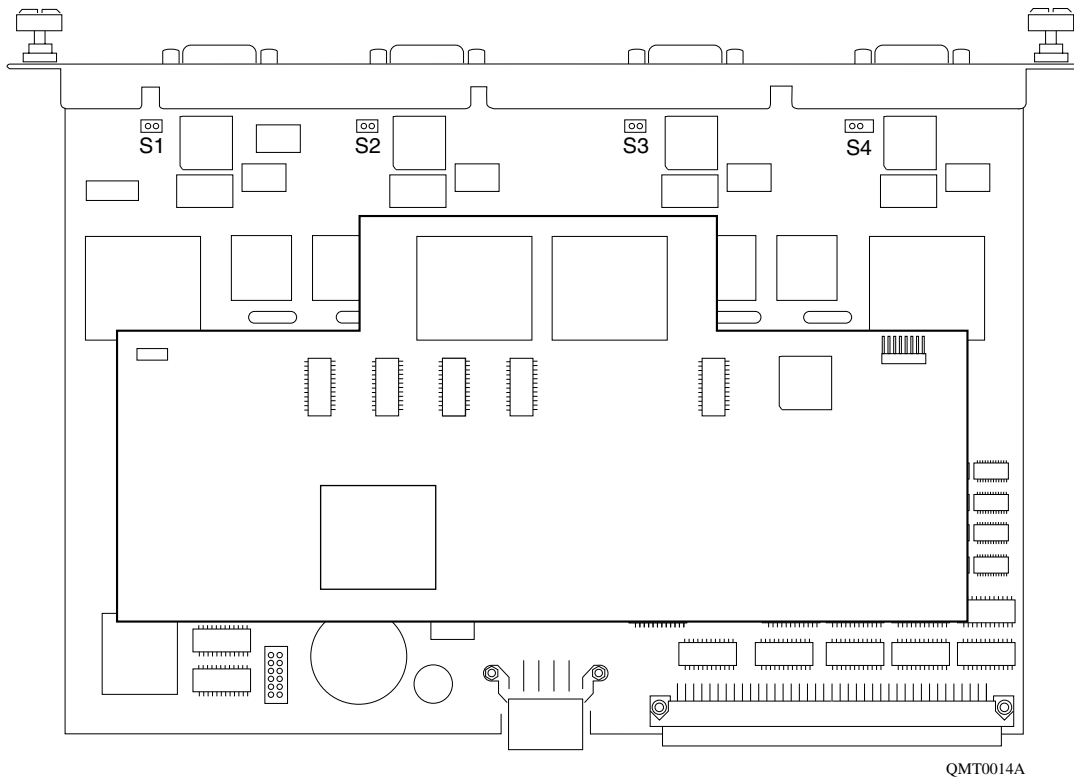
## Setting Jumpers on the QMCT1 and QMCT1-DS0A Link Modules

Figure 1-5 shows the user-configurable jumpers on the QMCT1 link module (Order No. AG2111007).



**Figure 1-5. Jumpers on the QMCT1 Link Module**

Figure 1-6 shows the user-configurable jumpers on the QMCT1-DS0A link module (Order No. AG 2104052).



**Figure 1-6. Jumpers on the QMCT1-DS0A Link Module**

Before installing the QMCT1 or QMCT1-DS0A link module, refer to [Table 1-2](#) to ensure that the position of each user-configurable jumper matches the cable shield grounding requirements of your BN platform...

**Table 1-2. QMCT1 or QMCT1-DS0A Link Module Jumper Settings**

Jumper	Option	Jumper Position	Description
S1	Cable shield for COM1 port	Installed (default)	Cable shield ground is connected to Port 1 ground and to pins 2 and 4 of the COM1 connector.
		Not installed	Cable shield is not grounded.
S2	Cable shield for COM2 port	Installed (default)	Cable shield ground is connected to Port 2 ground and to pins 2 and 4 of the COM2 connector.
		Not installed	Cable shield is not grounded.
S3	Cable shield for COM3 port	Installed (default)	Cable shield ground is connected to Port 3 ground and to pins 2 and 4 of the COM3 connector.
		Not installed	Cable shield is not grounded.
S4	Cable shield for COM4 port	Installed (default)	Cable shield ground is connected to Port 4 ground and to pins 2 and 4 of the COM4 connector.
		Not installed	Cable shield is not grounded.



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## Chapter 2

# Installing the Link Module

Complete the steps in this chapter to install the T1 link module in your BLN, BLN-2, or BCN platform.



**Note:** *You can install the QMCT1 link module in any BLN, BLN-2, or BCN with a FRE<sup>®</sup>-2 processor that is running Router Software Version 11.0 and Site Manager Version 5.0 or later, or BayStream Version 7.0 or later. The FRE-1 Fast Routing Engine processor does not support the QMCT1 link module. However, both the FRE-1 and FRE-2 processors support the Dual T1 and Single- and Dual-Port MCT1 link modules.*

## Inserting the Link Module

Install the link module in the BLN, BLN-2, or BCN as follows:

### 1. Attach an antistatic wrist strap.

BN platforms and link modules ship with an antistatic wrist strap. You must wear one of these straps whenever you access components in a BN platform.

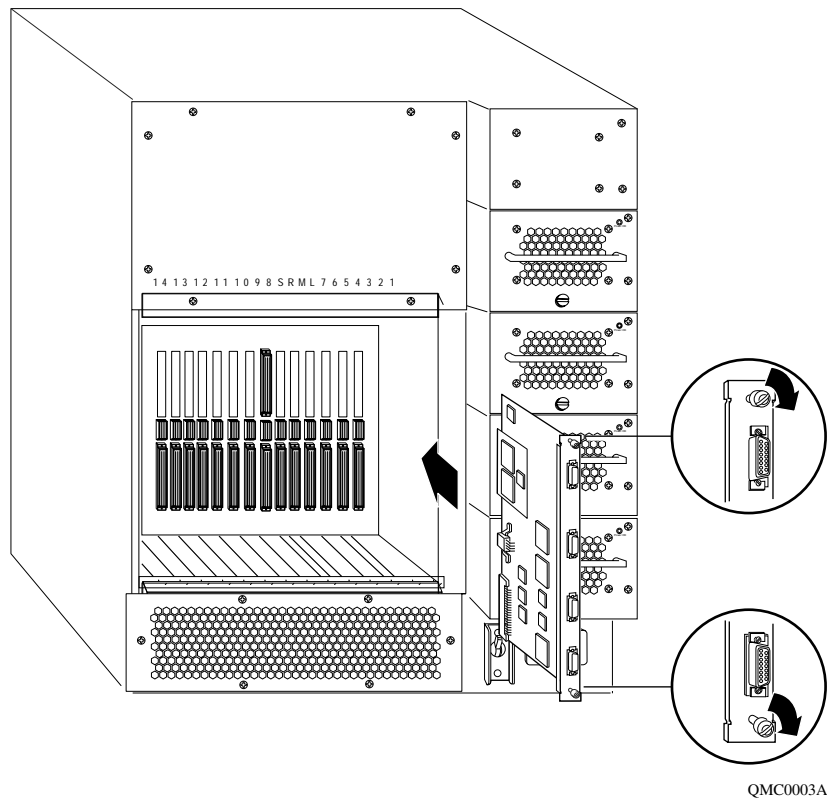
The antistatic wrist strap directs the discharge of static electricity from your body to the chassis, thereby avoiding discharge and possible damage to sensitive electronic components.



**Caution:** *Electrostatic discharge can damage hardware. Always use the antistatic wrist strap when handling any router components.*

2. **Slide the module into the appropriate slot, using the slot card guides.**  
Refer to Figure 1-1 (BLN), 1-2 (BLN-2), or 1-3 (BCN) in Chapter 1 for slot locations.
3. **Insert the module until its connector panel touches the router back panel.**
4. **Secure the captive screw on each end of the module ([Figure 2-1](#)).**

[Figure 2-1](#) shows the captive screws on a QMCT1 link module; these screws are the same on all link modules.



**Figure 2-1. Link Module Captive Screws (BCN Example)**

5. **Once you are done accessing the interior of the chassis, remove the antistatic wrist strap.**

## Connecting Cables

Connect the appropriate cabling to the link module ports.

For 15-pin Sub-D (DB15) connections, attach T1 cables directly to the link module ports. For RJ interface connections, connect DB15-to-RJ48 adapter cables to the link module ports (Bay Networks Order No. 7153).

Refer to the *Cable Guide* for information about the cables Nortel Networks supports for link modules.





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## Chapter 3

# Checking Status Indicators

This chapter describes the status indicator lights (or LEDs) on the Dual T1 link module, and on the Single-, Dual-, and Quad-Port MCT1 link modules. Use the LEDs to verify that the link module is operating after installation.



**Note:** *We recommend that you issue the **diags** command to the associated slot, using the Nortel Networks Technician Interface, immediately after you insert a link module. (Refer to Using Technician Interface Software if you use router software or Troubleshooting and Testing if you use BayStream software.) Otherwise, the link module FAIL LED will remain lit, indicating that diagnostics have not run on the Intelligent Link Interface (ILI). However, even if you do not issue the **diags** command, the link module initializes and becomes operational as long as the board functions properly and contains the correct interface configurations.*





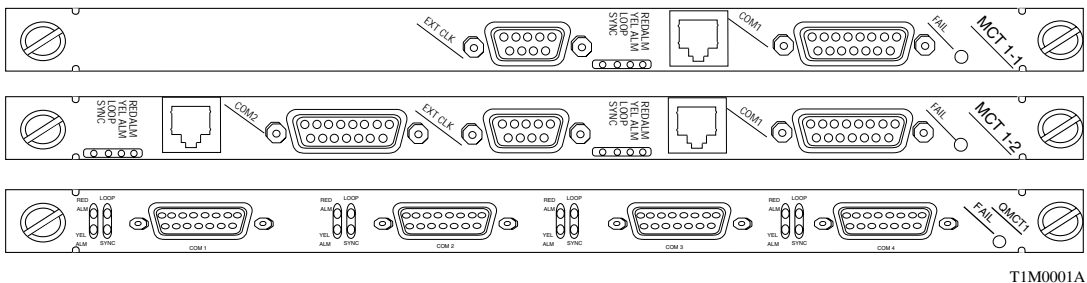
**Note:** A T1 link module normally reports a yellow alarm whenever it receives a 0 in Bit 2 of 256 consecutive channels. Nortel Networks uses several encoding algorithms to prevent the reporting of a false alarm when a normal data stream contains a 0 in this bit.

The DACS T1-64K link module (Model 5200; Order No. 101667) uses a proprietary encoding algorithm to accept an all 0s condition without reporting a false yellow alarm. However, a DACS T1-64K link module must be installed on the receiving end to decode the data.

The DACS T1-56K link module (Model 5201; Order No. 100831) sets Bit 7 of every channel to a 1 to prevent the false yellow alarm. Even if an all 0s condition occurs, the 1 maintains frame synchronization. You can use any standard T1 link module on the receiving end, but bandwidth will be reduced to 56 Kb/s.

## Multichannel T1 (MCT1) Link Module LEDs

This section describes the LEDs on MCT1 link modules. Figure 3-2 shows the LEDs on the Single-, Dual-, and Quad-Port MCT1 link modules. [Table 3-2](#) describes the function of each LED.



**Figure 3-2. MCT1 LEDs**

**Table 3-2. Functions of the MCT1 Link Module LEDs**

LED	Function
RED ALM (alarm)	Indicates a Loss of Frame (LOF) or a Loss of Signal (LOS) condition.
YEL ALM	Indicates the reception of a Yellow Alarm, which indicates that the remote end of the T1 line is in a Red Alarm state.
LOOP	Indicates one of the following: <ul style="list-style-type: none"><li>• The T1 port has entered Payload Loopback.</li><li>• The T1 port has entered Line Loopback.</li><li>• The T1 port is isolated from the network because the T1 port relay has engaged.</li></ul>
SYNC	Indicates that the port is configured and is synchronized to the T1 network.
FAIL	Indicates one of the following: <ul style="list-style-type: none"><li>• Diagnostic testing is in progress. Diagnostic testing occurs when you cold-start the module. You cold-start the module when you cycle power, issue the <b>diags</b> command from the Technician Interface, or hot-swap the link module. This LED blinks three times and goes out when the diagnostic testing terminates successfully.</li><li>• Power-up diagnostic testing failed and the link module is waiting for an automatic attempt to reinitiate diagnostic testing. If this LED turns on again, call the Nortel Networks Technical Response Center.</li><li>• A link module hardware problem exists and the link module is waiting for an automatic attempt to reinitiate diagnostic testing. If this LED turns on again, call the Nortel Networks Technical Response Center.</li></ul>